KASBIT Business Journal, 17 (2), 56-74
Alvi, J., et al.

KASBIT BUSINESS JOURNAL

Journal homepage: www.kbj.kasbit.edu.pk

Investors' Overreaction on Stock Circuit Breakers and Signaling - A Research on Pakistan Stock Exchange

Dr. Jahanzaib Alvi[i], Dr. Muhammad Rehan[ii] and Dr. Muhammad Nadeem Khan[iii]

i) *Assistant Professorr, Iqra University, Karachi.*
ii) *Assistant Professor, Department of Accounting and Finance, Institute of Business management (IoBM), Karachi.*
iii) *Associate Professor, Iqra University, Karachi.*

ARTICLE INFO

Keywords:
Circuit Breakers, Signaling, Prospect Theory, Disposition Effect

ABSTRACT

Purpose – To investigate the effect of circuit breakers on investors' post-event investment behavior and potential overreaction.

Design/methodology/approach - We analyzed daily stock returns (as the dependent variable) for instances when a circuit breaker was triggered, using the preceding day's returns as an independent variable. To enhance the study's robustness, we divided our sample into three distinct panels and conducted mean and variance equality tests for each. The sample consisted of firms from the KSE-100 index. We applied Ordinary Least Squares (OLS) regression analysis to these panels.

Findings - The average return for stocks on the day following a circuit breaker event was found to be 6.20% (1.24 times the circuit breaker threshold). Returns typically followed the same direction (positive/negative) as the circuit breaker event. Notably, negative circuit breakers had less impact on investors compared to positive ones, aligning with prospect theory.

Research limitations/implications - This study aids in understanding the impact of circuit breakers on investor overreaction, contributing to better-informed market decisions. The research is limited to circuit breaker events; future studies may employ different methodologies, statistical tools, timeframes, and markets.

Originality/value - This research advances the understanding of behavioral finance, particularly in the context of market signaling and information asymmetry. It addresses the gap in literature on behavioral finance's role in stock market signaling by examining the effects of circuit breaker events on investor overreaction.

Corresponding Authors: Dr. Jahanzaib Alvi
Email: jahanzaib.alvi@iqra.edu.pk

Received: 2nd July, 2024
Received in revised form: 24th September, 2024
Accepted: 2nd October, 2024

1. Introduction:

The market crash worldwide in OCTOBER 1987 was a clear example of panic and huge uncertainty in stock markets. Total of 23 markets crashed at that time while 19 of them decreased by over 20% (Lauterbach & Ben-Zion, 1993). Still, stock markets around the world are affected by the existence of systematic risk and the investing decisions by the investors depend upon such risk and efficiency of stock markets where frequency of substantial decrease in prices of shares has increased. For management of this risk, various stock exchanges including Pakistan Stock Exchange (PSX) use circuit breakers. These are mandated halts in trading of stocks which are used if an index or a scrip reflects a price deviation more than a pre-decided threshold in one trading day in order to bring stability in stock markets (Moin et al., 2020; Chen et al., 2017). Such large deviation in stock prices is result of herding behavior that induces investors to push level of prices of stocks (either lower or higher) creating excess volatility (Santoni & Liu, 1993).

In herding behavior, investors follow the movements of the market as they believe that market knows better than them (Connelly et al., 2011). This is in contrast with the traditionally held belief that investors in market act rationally and follow expected utility model. In reality, behavior of investors is highly influenced by psychological factors and biases than by rational decision. These psychological factors create circumstances not properly explained by conventional finance theories. Such circumstances tend to create market inefficiency and shake confidence of investors that could under or over-valuate securities of market and can cause market crashes (Lux, 1995). This is when the event of circuit breakers may help avoid excessive price deviations in a single day occurring due to irrational behavioral factors (Kim & Yang, 2004) by solving informational problems (Greenwald & Stein, 1999).

However, some questioned the effectiveness of circuit breakers in reducing market volatility. Switzer & Yue (2019) argued that circuit breakers are ineffective. While, Schwert (1990) suggested that market volatility decreases on day of hitting of circuit breaker but returns on the next trading day. Grossman & Stiglitz (1976) argued that due to information asymmetry, CB can result in giving wrong signal to the investors who owing to misinterpretation of these signals might invest more or withdraw all of their funds in the next trading day causing more volatility. As per Li et al., (2020) when market wide circuit breaker was implemented in china in 2016, it caused market crashes. Hence, it is quite possible that the usage of circuit breakers may halt strong price deviations on one trading day but due to presence of speculations, information asymmetry and herding behavior among investors can cause greater variation in price on the next trading day causing market inefficiency (Connelly et al., 2011) & (Moin et al., 2020). The impact of circuit breakers is not extensively studied. As such, mixed evidence is available on impact of circuit breakers (Kim & Yang, 2004). Hence, the purpose of this study is to highlight circuit breakers' post event impact on investors' investment behavior or overreaction.

Existing literature presents conflicting views on the role of circuit breakers in stock market stability. While intended to curb panic and volatility, their actual effect on investor behavior and market efficiency is under debate, with some suggesting they may inadvertently increase post-halt volatility due to information asymmetry and speculative behavior. Moreover, there's a lack of understanding about how investors' herding instincts interact with circuit breaker mechanisms. Research has also not thoroughly examined the signaling impact of circuit breakers on investment decisions, a gap particularly noticeable in emerging markets like the Pakistan Stock Exchange. This study seeks to address these gaps by examining the aftermath of circuit breaker events on investor behavior and market dynamics in such contexts.

We employ Ordinary Least Square (OLS) on our data of firms of PSX 100 index from January 01, 2000 to May 04, 2021. Using their daily stock returns (absolute returns as dependent variable) for each circuit breaker hit and lagged returns in against of each circuit breaker hit (as in independent variable), we find that on an average, when circuit breakers are implemented, each stock reflects around 6.20% return (1.24 time of CB) on next trading day. We also find that returns and circuit breaker hit remain in the same direction (both positive and both negative). We further observe that in line with prospect theory when circuit breakers are hit due to sharp decrease in stock market prices (negative circuit breakers), their influence on investor is less as compared to when positive circuit breakers are hit. For robustness analysis, we decompose our sample in three more panels and also use mean and variance equality tests for each panel for further robustness check.

To delve into the complexities of investor behaviour in response to circuit breakers, this study is structured as follows: In section two, the author has systematically reviewed the literature regarding circuit breakers and signalling theories; and circuit breakers and behavioural finance. The operationalisation of the research strategy, the sampling technique, and the formulation of the theoretical propositions are given in Section 3. Section 4 provides the empirical analysis of the study in form of the results of basic statistics and regression tests. Lastly, Section 5 provides a conclusion about the various insights of the study, as well as recommendations to the scholars and practitioners, and the limitations that were observed in this study and future research directions.

2. Literature Review

2.1 Background

The concept of efficient market hypothesis (EMH) elaborate that the prices of stock/bonds will reflect all available information from market perspective and investor does not gain any profits based on any signalling information. An investors overall strategy is based on market efficiency. (Dsouza & Mallikarjunappa, 2015). Nisar and Hanif studied many Asian markets including Pakistan, Sri Lanka, India and Bangladesh by analysing historical data from the period of 1997 to 2011 and analysed that the efficiency of market is in its weaker form. Hamidet al., (2017) studied many Asian markets including Pakistan to analyse that prices do not follow market efficiency and investor take benefit from arbitrage process enabling them to take abnormal profits without carrying additional risk (Day, M. Y. et al., 2023).

The signalling theory is initially developed to assist and elaborate investors respond against asymmetric information in the capital market (Spence, 1973, 1974). The theory is based on the concept of agency that one party has complete information while other party is only rely what other party (seller) is intended to share (Nelson, 1970). Buyer reduces their risk through identification of characteristics which are considerable and relatable, may impact seller’s probability and overall performance, and that characteristic is called Signal (Bergh & Gibbons 2011). Signal alters the belief of individual buyer and conveys information to other. Signal is a credible information that covey information from seller to buyers (Spence, 2002). There are two conditions for signaling; first the signal must be costly to differentiate the selling firm from others. Second the buyers must believe that there must be a positive relation between the signal itself and source's primary quality. (Stiglitz, 1985; Stigler, 1961).

2.2 Behavioural Finance and Stock Circuit Breakers and Signaling

The impact of signaling concept on financial markets is broadly researched in past, signaling theory give signals through many parameters for example Initial Public Offering (IPO) pricing, the attributes of upper management, number and quality of strategic alliances, reputation of owners/founders, political ownership of stock. The quality of signal must correlate with the reputation of signaler because of large market noise and search for true and legitimate information but the signaler's credibility and the signal must be significant for a receiver to act accordingly. (Yasar et al, 2020). The signaling theory in the context of circuit breaker triggered, in investors perspective implicate the existence of information asymmetry between stock market and investor, causing the investor to make speculation on the price hike and frame the circuit breaker to promulgate signal that contradict the logic of using circuit breaker on first place.

Zeguang Li et al., (2020) in their study highlight the importance of circuit breakers, according to them circuit breakers had significant consequences to the stock exchange. However, every market in different country reacted in a different way. Circuit breakers in some specific cases show panic selling.

According to Zeguang Li et al., (2020), Circuit breakers might affect the stock prices even though if they are not accelerated, the itself existence of circuit breaker in stock market may influence the decision of stock investor even he circuit breaker might not accelerated. When prices reach near the price limit cap, due to investor anxiousness the volatility in price increase and further accelerate the stock market to hit circuit breaker.

Chen et al. (2018) developed a model to determine the impact of circuit breaker on stock market, on downward trend circuit breaker lower the prices of stock but increase the volatility instead of decreasing it. Circuit breaker shows the "magnetic effect" once the prices of stock approaches to its limit. It is very challenging to test the reliability of circuit breaker. Herding is by definition to include any behavior brought about by the interaction of individuals (Hirshleifer and Hong, 2003).

Herding effect refer to the perception of an individual by following other investor's investment behavior in capital market, in case individual follows foot prints of others in making investment then herding occurred (Erdenetsogt and Kallinterakis, 2016; Zahera, S. A., & Bansal, R., 2018 & 2019). Likewise, in Pakistan herd-behavior is observed in many stock markets around the globe evident from different studies including Chang et al., (2000) conducted study on Taiwan, South Korea and Japan, Kabir and Shakur (2018) study the market of Republic of India, Singapore and Malaysia, Bowe and Domuta (2004) study the market of Republic of Indonesia on herding behavior. Bowe and Domuta (2004) study the presence of herd-behavior in Jakarta Stock Market Indonesia (Asian) but also witness that during and after the period of 1997 when Asian crisis hit Jakarta stock market, the herding exists among foreigners as well as locals, foreign herding increased before crisis and with passage of time diminished gradually. (Yao et al., (2014) and Mobarek et al., (2014) in his study investigate and found that the herding behavior is more pronounced when market rising or falling.

2.3 Theoretical/Conceptual Framework

Figure 1 – Model Framework

2.4 Hypothesis

H1: There is a statistically significant positive relationship between the occurrence of a circuit breaker event and the stock return on the following trading day.

H0: There is no statistically significant relationship between the occurrence of a circuit breaker event and the stock return on the following trading day.

3. Data Collection and Methodological Study

Research methodology plays pivotal in research work, the crux of this research is to evaluate basic phenomena of circuit breaker and signaling in the capital market and find the impact of circuit breaker on the next trading day by measuring investor reaction (Moin, A., et al. 2020), hence research based authentic phenomena and logical reasoning, that places the study in positivism research philosophy, further the research is solely based on the quantitative/secondary data which relates with deductive research approach.

3.1 Data

KSE-100 holds more than 80% of capitalization of the Pakistan Stock Exchange (KSE-100 index is an adequate representative of entire stock market), we have target KSE-100 indexed companies because we believe that instead of taking whole 316 companies, we can only target the firms which are closer representative of entire population like KSE-100 indexed companies. We have developed 4 data panels to test the hypothesis along with robustness as mentioned above. For the Panel-A we have collected data from January 01 2000 to May 04, 2021 (21 years 2 months and 73 companies for those firms which have complete history more than 22 years) on daily basis for our main equations.

For testing robustness, we have further developed three more panels, such as Panel-B comprised on the daily basis data from January 01, 2005 to May 04, 2021 (16 years 2 months and 81 companies which have history more than 17 years), for Panel-C consists on the daily basis trading data from January 01, 2009 to May 04, 2021 (12 years 2 months and 88 companies which have history more than 13 years) and for Panel-D comprised on the daily basis data from January 26, 2015 to May 04, 2021 (6 years 2 months and 95 companies which have history more than 7 years), we have also winsorized the data in each panel with 99th percentile and 1st percentile to treat extreme values and spurious outliers (Charles P. Winsor, 1947).

We have daily closing prices of each hitting circuit break event same next trading day closing prices of hitting circuit breaker for all four panels. we have targeted only the events when it hits the circuit breaker threshold and closing prices of next trading day after this circuit breaker (it is an event based study) from KSE-100, data structure is discussed in detail above and return calculation is given in equation number 3 and for circuit breaker events, we have mentioned the entire details in the table number 3, further this event based study make sense that these event days that potentially measure the post-facto response of the investor/market when signal generated by the circuit breakers being hit. This study is a longitudinal study in nature (Unbalanced Panel Data) based on four different panels.

3.2 Modelling Circuit Breakers, Signaling and Overreaction

Almost all stock exchanges have systemic thresholds for the circuit breakers on the indexes and pursue to manage inherent systematic risk Moin et al., (2020) proposed model by using dummy variable for lagged return with circuit breaker returns to capture investors' reaction. Whereas, Grossman & Stiglitz, (1976) proposed signaling model to evaluate the circuit breaker events which gives hint/signal to the investor due to existence of information asymmetry. In extension to the Grossman & Stiglitz, (1976) model (Connelly, Certo, Ireland, & Reutzel, (2011) developed study to measure the reason of stock market volatility due to these market inefficiencies or signaling or information assymetery. Further on of the interesting study was conducted by Dreman & Lufkin, (2000) who research investor irrational behavior with respect to exuberant this inside market information or signaling that turns with upper or lower circuit breaker in the market. Dreman & Lufkin, (2000) by Nobel Laureate Kahneman & Tversky, (1979) and who presented prospect theory which narrates behavioral models how people decide between alternatives that involve risk and uncertainty, so in this research also based over model on the above-mentioned behavioral model such as Kahneman & Tversky, (1979) prospect theory is the main base of our model.

We have used independent variable as upper lower circuit breaker (this is also called upper/lower locked in market terminology) on the above given threshold (however, now the limit for the upper lower locked is around 7% but we have modelled the research very conservatively so we assumed the circuit breaker at 5% upper/lower sides), further we have captured investor reaction by using 1 day lagged return as in independent variable in the equation, which is illustrated in equation form as below.

Statistical Hypothesis

$\boldsymbol{H_1: \beta\ CB_{(t-1)} > 5}$

(If coefficient of "Circuit Breaker" is greater than 5 so the reaction of the investor on with will greater than "Circuit Breaker" threshold on the next trading day)

H_1: β $CB_{(t-1)}$ <= 5

(If coefficient of "Circuit Breaker" is greater than 5 so the reaction of the investor on with will less than or equal to "Circuit Breaker" threshold on the next trading day)

Equation 1

CBt = if Rt > 0.05 or 5% than 1 & if Rt < -0.05 than -1 otherwise 0

Equation 2

$CB_{(t-1)}$ = if $R_{(t-1)}$ > 0.05 or 5% than 1 & if $R_{(t-1)}$ < -0.05 than -1 otherwise 0

In Equations 1 and 2, "Rt" represents the daily return of a stock at time "t." This is calculated using Equation 3. We use these equations to create dummy variables that identify circuit breaker events. Specifically:

- CB_t: This dummy variable takes a value of 1 if the daily return at time "t" (Rt) exceeds the positive circuit breaker threshold of 5% (indicating a large upward price movement), -1 if the daily return is less than -5% (a large downward movement), and 0 otherwise.
- $CB_{(t-1):}$ Similar to CB_t, this dummy variable identifies circuit breaker events on the previous trading day (t-1) using the same thresholds.

We are interested in understanding how investors react to circuit breakers, so we use the next day's trading return as our dependent variable. This allows us to capture any overreaction or unusual trading behavior following a circuit breaker event.

Equation 3

$R_t = (CP_t/CP_{(t-1)}) – 1$

R_t = Daily Return

CP_t = Current Closing Price

$CP_{(t-1)}$ = Previous Closing Price.

Equation 3 defines how we calculate the daily return (R_t) for each stock. We utilize the closing price-based return calculation as it reflects the final traded price of the day, capturing the overall market sentiment and investor decisions. This method is commonly used in market microstructure and event studies as it is less susceptible to intraday fluctuations and is readily available for a wide range of stocks and time periods, making it appropriate for our analysis of circuit breaker impact on investor behavior.

To model the relationship between circuit breaker events and the subsequent day's returns, we employ the following regression model:

$Return(t) = \beta_0 + \beta_1 * CB_{(t-1)} + \varepsilon$

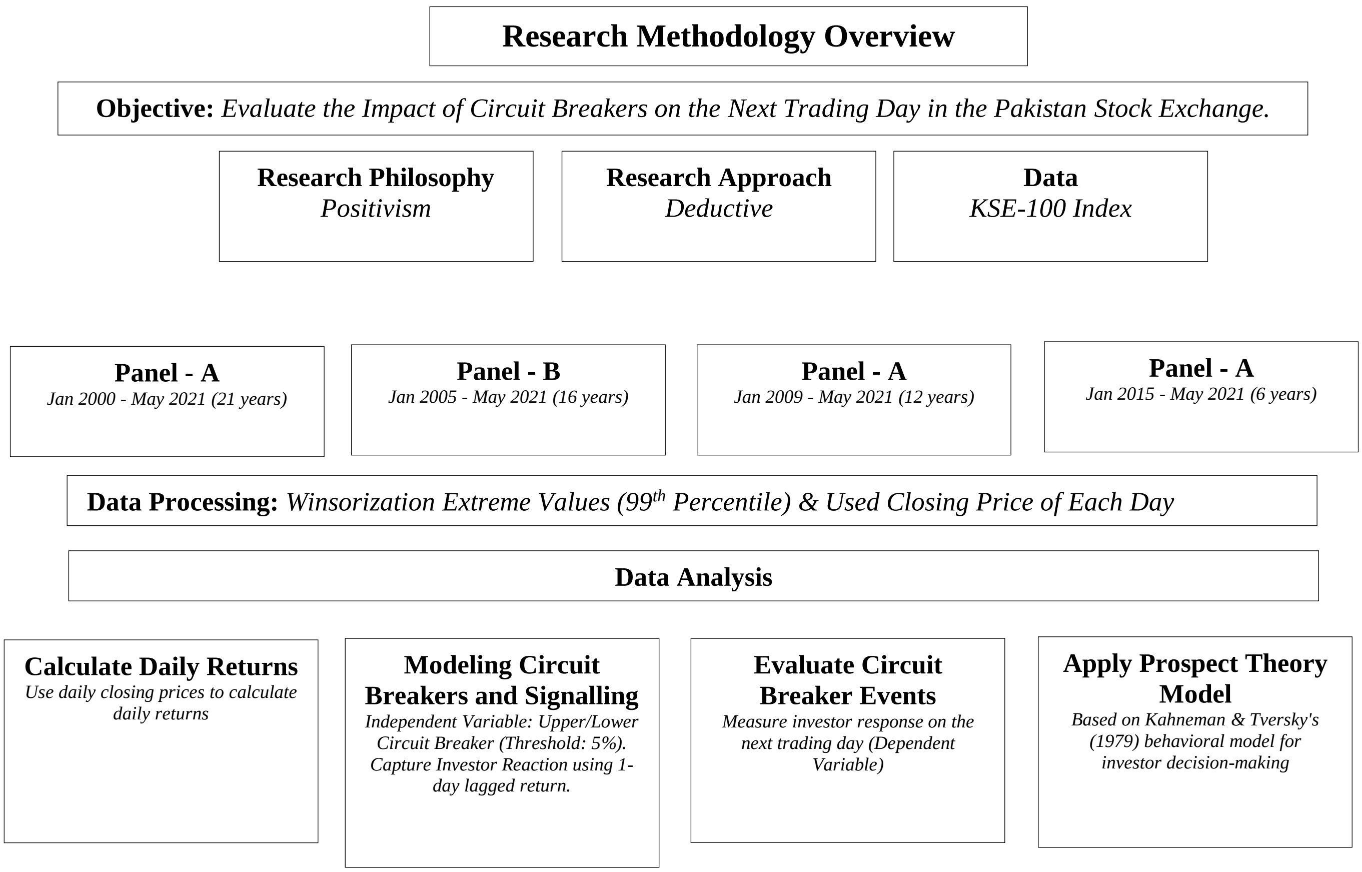
Where:

$Return_{(t)}$ is the daily return of a stock on day "t."

$CB_{(t-1)}$ is our dummy variable for circuit breaker events on the previous trading day (1 if a circuit breaker was triggered, 0 otherwise).

β_0 is the intercept term, representing the average daily return when a circuit breaker is not triggered.
β_1 is the coefficient for the circuit breaker variable, capturing the impact of a circuit breaker event on the next day's return.
ε is the error term, accounting for all other factors influencing daily returns.

Figure – 2 Flow Chart of Research



4. Empirical Analysis

Table 1 - Descriptive Statistic of Companies' Performance and Circuit Breakers

time	Inception Date	Symbol-KSE	$\bar{x}$	$\tilde{x}$	σ	Min	Max	$CB_{(t-1)}$ +	$CB_{(t-1)}$ -	$Return_{(t)}$	Total
1	1982	ABOT	0.03%	0.00%	2.04%	-8.50%	7.53%	32	35	1384	1451
2	1961	AICL	0.01%	0.00%	2.17%	-9.72%	9.03%	28	52	1371	1451
3	1984	AGIL	0.05%	0.00%	2.48%	-8.26%	8.43%	22	24	1405	1451
4	2005	ABL	-0.01%	0.00%	1.72%	-7.50%	8.15%	13	25	1413	1451
5	1997	ARPL	0.04%	0.00%	1.91%	-11.38%	7.50%	51	53	1347	1451
6	1992	AKBL	0.02%	-0.05%	1.87%	-14.62%	7.56%	30	26	1395	1451
7	1965	ATLH	0.05%	0.00%	2.45%	-18.75%	20.00%	16	17	1418	1451
8	2005	APL	0.00%	-0.01%	1.90%	-11.77%	9.33%	18	27	1406	1451
9	1980	ATRL	0.06%	-0.03%	2.90%	-9.14%	8.44%	26	23	1402	1451
10	1996	ANL	0.18%	-0.04%	3.63%	-12.21%	20.81%	47	62	1342	1451

11	2004	BAFL	0.04%	-0.02%	2.06%	-12.47%	8.51%	35	38	1378	1451
12	1992	BAHL	0.05%	0.00%	1.82%	-11.40%	9.02%	25	32	1394	1451
13	1991	BOP	0.03%	-0.16%	2.54%	-12.92%	11.58%	15	21	1415	1451
14	1992	BNWM	0.03%	-0.02%	2.85%	-10.31%	11.49%	17	26	1408	1451
15	2002	BYCO	-0.02%	-0.24%	3.00%	-12.83%	13.86%	16	18	1417	1451
16	1990	CEPB	0.07%	-0.10%	2.69%	-17.88%	9.27%	11	10	1430	1451
17	1985	CHCC	0.08%	-0.04%	2.63%	-10.60%	8.00%	32	39	1380	1451
18	1984	COLG	0.08%	0.00%	2.50%	-16.74%	11.53%	30	47	1374	1451
19	1992	DGKC	0.01%	-0.10%	2.44%	-7.50%	7.50%	24	38	1389	1451
20	1971	DAWH	0.02%	-0.04%	2.07%	-9.61%	7.97%	17	21	1413	1451
21	2015	DCR	0.00%	0.00%	1.23%	-9.42%	8.80%	37	48	1366	1451
22	1949	EFUG	0.03%	0.00%	2.43%	-11.33%	7.91%	36	50	1365	1451
23	1968	ENGRO	0.02%	-0.04%	1.74%	-9.79%	7.53%	16	21	1414	1451
24	2014	EFERT	-0.01%	-0.07%	1.55%	-9.02%	7.49%	19	17	1415	1451
25	2008	EPCL	0.16%	0.00%	2.73%	-8.47%	9.66%	37	52	1362	1451
26	2010	FATIMA	-0.01%	-0.04%	1.93%	-9.23%	9.07%	20	16	1415	1451
27	1996	FCCL	0.00%	-0.11%	2.30%	-7.81%	8.34%	45	30	1376	1451
28	1996	FFBL	-0.02%	-0.22%	2.42%	-11.55%	8.12%	18	25	1408	1451
29	1992	FFC	-0.01%	-0.07%	1.52%	-8.10%	7.61%	32	39	1380	1451
30	1995	FABL	0.05%	0.00%	2.20%	-10.07%	8.43%	35	48	1368	1451
31	1975	FML	0.07%	0.00%	2.93%	-16.01%	40.11%	27	51	1373	1451
32	1985	FHAM	0.01%	0.00%	1.96%	-16.05%	10.40%	74	72	1305	1451
33	1994	GADT	0.06%	0.00%	2.49%	-10.30%	8.31%	41	51	1359	1451
34	1994	GHGL	0.08%	0.00%	2.32%	-30.55%	7.51%	23	23	1405	1451
35	1953	GLAXO	0.01%	-0.16%	2.11%	-8.08%	7.50%	34	48	1369	1451
36	1970	GATM	0.05%	-0.09%	2.51%	-16.77%	9.39%	14	18	1419	1451
37	2007	HBL	-0.02%	-0.01%	1.89%	-8.60%	6.49%	34	39	1378	1451
38	1992	HMB	0.03%	0.00%	1.82%	-13.92%	7.49%	22	33	1396	1451
39	2014	HASCOL	-0.07%	-0.15%	3.27%	-65.06%	9.54%	183	197	1071	1451
40	1980	HGFA	0.00%	0.00%	1.52%	-11.68%	18.24%	30	41	1380	1451
41	1995	HINOON	0.11%	0.00%	2.24%	-10.50%	7.78%	37	59	1355	1451
42	1994	HCAR	0.06%	-0.15%	2.67%	-8.70%	7.78%	22	30	1399	1451
43	1994	HUBC	0.00%	-0.06%	1.85%	-7.50%	8.25%	11	19	1421	1451
44	1995	IBFL	0.09%	0.00%	2.58%	-12.00%	8.04%	45	55	1351	1451
45	1957	ICI	0.07%	0.00%	2.04%	-8.82%	8.19%	12	14	1425	1451
46	1995	IGIL	0.02%	0.00%	2.29%	-8.87%	10.83%	14	23	1414	1451
47	1992	INDU	0.01%	-0.06%	1.93%	-8.02%	7.78%	7	9	1435	1451
48	1984	INIL	0.11%	-0.14%	2.71%	-8.64%	8.05%	12	10	1429	1451
49	2011	ISL	0.11%	-0.03%	2.76%	-7.80%	8.05%	15	18	1418	1451
50	1992	JDWS	0.01%	0.00%	2.46%	-11.91%	11.84%	46	44	1361	1451
51	1996	JLICL	0.03%	0.00%	2.60%	-20.72%	11.52%	6	11	1434	1451
52	1949	KEL	-0.03%	-0.24%	2.47%	-11.71%	13.42%	36	68	1347	1451
53	1996	KOHC	0.05%	-0.08%	2.48%	-8.56%	7.85%	18	40	1393	1451
54	1971	KTML	0.05%	0.00%	2.62%	-9.76%	9.25%	31	39	1381	1451
55	2005	KAPCO	-0.04%	-0.05%	1.96%	-12.67%	7.67%	13	42	1396	1451
56	2001	LOTCHEM	0.09%	-0.15%	2.71%	-12.84%	13.10%	28	44	1379	1451
57	1995	LUCK	0.06%	-0.06%	2.09%	-7.81%	9.36%	11	23	1417	1451
58	1994	MLCF	0.00%	-0.11%	2.68%	-19.42%	7.47%	10	21	1420	1451
59	1994	MARI	0.11%	-0.03%	2.00%	-8.08%	7.57%	29	50	1372	1451
60	1992	MCB	-0.01%	-0.03%	1.66%	-9.24%	7.13%	121	183	1147	1451
61	2000	MEBL	0.10%	0.00%	2.02%	-10.32%	8.07%	21	33	1397	1451

62	1965	MTL	0.05%	-0.04%	2.05%	-14.17%	7.72%	19	28	1404	1451
63	1949	MUREB	-0.01%	0.00%	2.23%	-10.03%	7.68%	40	50	1361	1451
64	2002	NBP	-0.01%	-0.05%	2.01%	-14.60%	7.90%	23	29	1399	1451
65	1989	NATF	0.01%	0.00%	2.34%	-19.73%	13.66%	8	16	1427	1451
66	1964	NRL	0.10%	-0.03%	2.87%	-8.62%	8.64%	37	29	1385	1451
67	1980	NESTLE	-0.02%	0.00%	2.18%	-9.56%	10.68%	93	140	1218	1451
68	1991	NCL	0.04%	-0.03%	2.36%	-8.33%	8.19%	21	36	1394	1451
69	1961	NML	0.00%	-0.01%	2.23%	-8.57%	7.58%	47	46	1358	1451
70	2004	OGDC	-0.03%	-0.06%	1.88%	-8.15%	7.58%	28	34	1389	1451
71	1988	OLPL	-0.02%	0.00%	1.96%	-16.79%	7.12%	27	51	1373	1451
72	1965	PKGS	0.01%	-0.07%	2.12%	-7.53%	7.71%	16	28	1407	1451
73	1988	PAEL	-0.02%	-0.06%	2.72%	-10.44%	7.97%	13	9	1429	1451
74	1985	PSMC	0.00%	-0.10%	2.72%	-8.52%	8.24%	17	25	1409	1451
75	2013	PIBTL	-0.03%	-0.23%	2.77%	-20.86%	21.77%	36	69	1346	1451
76	1979	POL	0.02%	-0.07%	1.97%	-10.09%	7.72%	46	68	1337	1451
77	2004	PPL	-0.01%	-0.12%	1.97%	-7.71%	8.05%	13	21	1417	1451
78	1977	PSO	0.02%	-0.10%	2.08%	-8.29%	7.90%	60	89	1302	1451
79	1996	PTC	-0.03%	-0.13%	2.03%	-10.98%	11.88%	21	17	1413	1451
80	1956	PAKT	0.07%	0.00%	2.63%	-8.98%	10.08%	7	14	1430	1451
81	1992	PIOC	0.06%	-0.07%	2.78%	-8.56%	8.72%	14	14	1423	1451
82	1984	POML	0.06%	0.00%	3.13%	-13.02%	14.97%	11	16	1424	1451
83	1970	SRVI	0.05%	0.00%	2.53%	-22.35%	7.94%	19	14	1418	1451
84	1970	SHEL	0.02%	-0.13%	2.50%	-7.53%	8.47%	23	27	1401	1451
85	1995	SHFA	0.01%	0.00%	2.44%	-14.29%	7.58%	12	8	1431	1451
86	2007	SCBPL	0.06%	0.00%	2.53%	-10.85%	7.97%	9	11	1431	1451
87	1964	SNGP	0.06%	-0.09%	2.84%	-13.12%	8.11%	25	41	1385	1451
88	1956	SSGC	-0.05%	-0.16%	2.62%	-8.95%	9.16%	33	59	1359	1451
89	2015	SYS	0.19%	0.00%	2.54%	-8.16%	8.56%	10	15	1426	1451
90	1967	THALL	0.05%	-0.03%	2.21%	-7.88%	9.52%	22	33	1396	1451
91	1993	SEARL	0.07%	-0.13%	2.46%	-8.26%	7.44%	44	52	1355	1451
92	2003	TRG	0.19%	0.10%	3.37%	-10.00%	8.67%	11	6	1434	1451
93	2005	UBL	0.00%	-0.07%	1.87%	-8.17%	7.83%	54	54	1343	1451
94	1994	UNITY	0.41%	0.00%	4.29%	-16.63%	29.41%	5	3	1443	1451
95	1989	YOUW	0.15%	-0.31%	5.44%	-19.83%	38.17%	24	51	1376	1451

Note: we have developed table 1 statistics only for the Panel-D because this Panel-D has maximum firms, the statistics is for last 6 years having 95 companies, and we have removed firms which do not have complete history more than 7 years. Further, as we have winsorized data at 1st percentile and 99th percentile to meet with extreme values spurious outliers within data, all other panel's statistic will be provided upon request.

Table – 1 In order to provide stakeholders with a comprehensive understanding of the population structure, we have gathered data from 95 companies within the KSE-100 index. These statistics offer a snapshot of the individual performance of each indexed company over a span of 6 years. The objective is to furnish stakeholders with essential descriptive measures, including mean, median, standard deviation, minimum, and maximum values.

The purpose of presenting these statistics is to serve as a valuable guide and reference point for stakeholders engaged in this research. By examining the performance metrics of each company within the KSE-100 index, stakeholders can gain insights into the dynamics and trends of the market. Importantly, Table-1 encompasses both circuit breaker and non-circuit breaker data, enabling stakeholders to develop a nuanced understanding that aligns with their specific reference points and areas of interest.

Table 2 – Descriptions of Panel Construction

Description	$CB_{(t-1)}$ +	$CB_{(t-1)}$ -	$Return_{(t)}$	Total
Panle - A	12,693	8,768	361,726	383,187
Panle - B	17,821	13,034	623,973	654,828
Panle - C	7,180	5,038	257,150	269,368
Panle - D	2,715	3,591	131,539	137,845

Note: we have winsorized data on the 1st percentile and 99th percentile in each panel to settle the extreme values and spurious outliers.

Table - 2 illustrates the organization of our research data into four distinct panels. We have categorized the data into Positive and Negative Circuit events, which are central to Hypothesis - 2, enabling us to evaluate the impact of circuit breakers on market behavior.

To ensure the robustness of our findings and hypotheses, we've created three additional panels. These panels offer a broader perspective, enhancing the reliability of our research by covering various timeframes and subsets of companies.

Furthermore, we've included data on returns with the current value after circuit breaker events. This data is crucial for analyzing our main hypothesis and delving deeper into investor reactions and market dynamics.

Table 3 – Data Stationary

	Augmented Dickey-Fuller		PP test statistic	
Description	**t-Statistic**	**Prob.***	**t-Statistic**	**Prob.***
Panel - A				
$CB_{(t-1)}$	-108.67	0.00	-160.05	0.00
$Returns_{(t)}$	-49.50	0.00	-179.18	0.00
Panel - B				
CB(t-1)	-89.53	0.00	-128.18	0.00
Returns(t)	-90.60	0.00	-141.64	0.00
Panel - C				
CB(t-1)	-74.21	0.00	-105.99	0.00
Returns(t)	-51.73	0.00	-115.25	0.00
Panel - D				
CB(t-1)	-56.84	0.00	-80.22	0.00
Returns(t)	-82.21	0.00	-82.75	0.00

Table – 3 represents data stationary, we have used Augmented Dickey-Fuller (ADF) & Phillip Perron (PP) (Dickey and Wayne Fuller, 1979; Peter C. B. Phillips and Pierre Perron, 1988) Tests.

Table 4 – Regression Analysis (Main Equation)

Main Equation			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**
Panel-A			
$CB_{(t-1)}$	6.109	0.101	60.203
(Constant)	0.912	0.048	19.048
		Adjusted R-Square	0.124
		Durbin-Watson	2.042

Note: For the Panel-A we have collected data from January 01 2000 to May 04, 2021 (21 years 2 months and 73 companies for those firms which have complete history more than 22 years) on daily basis for our main equations. we have also winsorized the data in each panel with 99th percentile and 1st percentile to treat extreme values and spurious outliers (Charles P. Winsor, 1947), we also placed Durbin-Watson Durbin, J. and Watson, G. (1950) for measuring autocorrelation in the model, and *, **, *** show significance level at 1%, 5% and 10% respectively.

Table – 4 our main regression results draw from more than 21 years of data involving circuit breakers and encompass 71 listed companies within the KSE-100 index. The primary objective is to examine investor responses following circuit breaker events.

In our analysis, the coefficient of $CB_{(t-1)}$ stands at 6.109, surpassing the circuit breaker threshold of 5 (which represents lagged values of circuit breakers as an independent variable). Importantly, the coefficient value is statistically significant at a 1% level, indicating high generalizability. Consequently, our first alternative hypothesis is supported, suggesting that investor reactions on the next trading day exceed the benchmarked circuit breaker threshold.

Furthermore, it's noteworthy that approximately 12.4% of the variation can be explained by the independent variable. We have also conducted a Durbin-Watson (DW) test, which indicates no autocorrelation in the model.

The adjusted R-squared value, accounting for about 12.4% of the variation due to the change in the independent variable (i.e., circuit breaker events), underscores that investor returns on days following circuit breaker events are influenced primarily by this specific variable. The findings are aligning with (Moin, A., et al. 2020).

Table 5 – Regression Analysis (Decomposing)

Equation Decomposing			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**
Panel-B			
$CB_{(t-1)}$	6.307	0.111	56.806*
(Constant)	0.646	0.051	12.7*
Adjusted R-Square	*0.15*	Durbin-Watson	*2.013*
Panel-C			
$CB_{(t-1)}$	6.472	0.131	49.256*
(Constant)	0.768	0.057	13.369*
Adjusted R-Square	*0.164*	Durbin-Watson	*1.987*

Panel-D			
$CB_{(t-1)}$	5.953	0.154	38.72*
(Constant)	0.608	0.066	9.151*
Adjusted R-Square	*0.162*	Durbin-Watson	*1.932*

Note: Panel-B comprised on the daily basis data from January 01, 2005 to May 04, 2021 (16 years 2 months and 81 companies which have history more than 17 years), for Panel-C consists on the daily basis trading data from January 01, 2009 to May 04, 2021 (12 years 2 months and 88 companies which have history more than 13 years) and for Panel-D comprised on the daily basis data from January 26, 2015 to May 04, 2021 (6 years 2 months and 95 companies which have history more than 7 years), we have also winsorized the data in each panel with 99th percentile and 1st percentile to treat extreme values and spurious outliers (Charles P. Winsor, 1947), and *, **, *** show significance level at 1%, 5% and 10% respectively.

Table - 5 presents a crucial regression analysis that complements and reinforces our main regression findings. To enhance the robustness of our research, we decomposed the dataset (Chen, Z., Li, J., & Li, Y., 2024) into three additional panels, effectively using them as a proxy for a robustness test.

Remarkably, our decomposed regression analyses yielded consistent and stable results across all panels. Particularly, Panel-C exhibited the most noteworthy outcomes, with higher coefficient values and an elevated adjusted R-squared. This leads us to conclude that our primary regression equation receives substantial support and validation from the results of the robustness/decomposing analysis.

Table 6 – Supplementary Analysis

Test for Equality of Variances Between Series

Method	**df**	**Value**	**Probability**
Panel-A			
F-test	(25516, 25517)	300.022	0.000
Siegel-Tukey		187.148	0.000
Bartlett	1	110338.60	0.000
Levene	(1, 51033)	42675.72	0.000
Brown-Forsythe	(1, 51033)	39376.32	0.000
Panel-B			
F-test	(18351, 18352)	266.024	0.000
Siegel-Tukey		161.087	0.000
Bartlett	1	77164.01	0.000
Levene	(1, 36703)	35094.97	0.000
Brown-Forsythe	(1, 36703)	34699.47	0.000
Panel-C			
F-test	(12394, 12395)	255.893	0.000
Siegel-Tukey		132.401	0.000
Bartlett	1	51638.46	0.000
Levene	(1, 24789)	27864.30	0.000
Brown-Forsythe	(1, 24789)	27365.67	0.000
Panel-D			
F-test	(7725, 7726)	218.044	0.000
Siegel-Tukey		105.594	0.000
Bartlett	1	30960.07	0.000
Levene	(1, 15451)	27285.75	0.000
Brown-Forsythe	(1, 15451)	26000.92	0.000

Note: Table – 6 represent results of equality of variance, we have used Leven's (Levene, Howard., 1960) and Brown-Forsythe (Brown, Morton B.; Forsythe, Alan B., 1974) the tests of robustness of equality of variances, in accordance with F-test the null hypothesis (There is no Difference in variance in series) is rejected because p-value of F-test is less than 0.05 or 5% (alpha value), which means that the variables have homogeneity in variances and it is desirable, it is further reconfirm by the Leven's and Brown-Forsythe tests where we found the p-values are less than 0.05 or 5% (alpha value), It can be justified by addressing that investors' reaction magnitude towards negative circuit breaker is less than positive circuit breaker.

To test the second hypothesis which is based on Kahneman and Tversky (1979)" Prospect Theory", that refers to the magnitude (Investors' response due to hit of circuit breaker) of negative outcome is higher than the positive outcome in context to human psychology, we have used independent sample t-test as appended above.

According to Odean. (1998) who studied disposition effect, as per his study investors demonstrate different trading attitude by increasing/decreasing volume in positive/negative circuit breaker, however we have just tested three streams with closing prices and for that we use below mentioned 2a hypothesis and this hypothesis is used for table – 7 & 8.

$$\mathbf{H_0: \mu_{(R)} = \mu_{(R-)} = \mu_{(R+)}}$$

$$\mathbf{H_{2a}: \mu_{(R)} \neq \mu_{(R-)} \neq \mu_{(R+)}}$$

Table 7 – Independent Samples t-Test

Test for Equality of Means Between Series

Method	df		Value	Probability
Panel-A				
t-test		51033	21.760	0.000
Satterthwaite-Welch t-test*		25686	21.759	0.000
Anova F-test	(1, 51033)		473.480	0.000
Welch F-test*	(1, 25686.1)		473.462	0.000
Panel-B				
t-test		36703	14.789	0.000
Satterthwaite-Welch t-test*		18489	14.788	0.000
Anova F-test	(1, 36703)		218.705	0.000
Welch F-test*	(1, 18489)		218.694	0.000
Panel-C				
t-test		24789	-15.041	0.000
Satterthwaite-Welch t-test*		12491	-15.041	0.000
Anova F-test	(1, 24789)		226.237	0.000
Welch F-test*	(1, 12490.9)		226.219	0.000
Panel-D				
t-test		15451	9.776	0.000
Satterthwaite-Welch t-test*		7796	9.776	0.000
Anova F-test	(1, 15451)		95.576	0.000
Welch F-test*	(1, 7795.85)		95.564	0.000

Note: The Welch test for means comparison is robust to the heterogeneity of variances and will give accurate results for mean comparison despite the groups having heterogeneous variances. The Welch test has the same hypotheses as the ANOVA test.

To test our second hypothesis, we have tested mean equality through Anova F-test (Fisher, R 1918) and Welch F-test (Welch, B. L., 1938) in all panels and found almost the same results. Both tests are used to compare the mean equality and the guideline is when p-value of both test is less then alpha value so we reject null hypothesis that there is no difference in the mean of three groups of trading days (Positive Circuit Breaker, Negative Circuit Breaker and No Circuit Breaker), however in Table – 8 we observed that p-value is significant at 1% alpha which means that there is difference (meaning mean are not equal) in mean value of three trading days and the findings are aligned with (Moin, A., et al. 2020).

4.1 Discussion

The central theme of our research revolves around assessing how investors respond to both positive and negative circuit breakers within the Pakistani stock market. These circuit breaker thresholds are a common feature in major stock exchanges worldwide. They serve as crucial safeguards for individual investors, particularly in times of economic instability, pandemics, global financial crises, default risks, insider trading, and information asymmetry.

In essence, circuit breakers are employed to prevent excessive and sudden price fluctuations and to curb herd behavior among investors. When circuit breakers are triggered, they can act as early signals of potential market anomalies or threats in the next trading day. These anomalies often arise from speculative activities among investors.

Hence, the primary objective of our research is to employ econometric modeling to delve into the dynamics of insider trading or signaling by management through the use of these circuit breakers or thresholds. By analyzing investor reactions in the context of circuit breakers, we aim to shed light on how market participants respond to critical events and information, ultimately contributing to a deeper understanding of market behavior.

5. Conclusion

Our research findings align with previous work, notably (Moin, A., et al. 2020). We've established that, on average, the day after a circuit breaker is triggered, stock returns tend to exceed the circuit breaker threshold, confirming our earlier equations. This phenomenon is indicative of increased speculation among stakeholders and investors in response to circuit breaker events, as demonstrated in Hypothesis One.

In the next phase, we formulated hypotheses to examine how positive and negative circuit breakers influence investor behavior concerning specific stocks. Our analysis revealed that investors indeed respond differently to these circuit breakers, a finding consistent with the behavioral insights of (Kahneman and Tversky 1979).

Moreover, we took a different angle by introducing a hypothesis that mirrored the no-circuit breaker scenario (Odean 1998). In this case, we used closing prices as a proxy for volume. The results consistently showed that investors tend to sell stocks when a positive circuit breaker is triggered and exhibit a preference to hold stocks when a negative circuit breaker is activated. These findings are in line with the observations made by (Odean 1998) and the behavioral principles outlined by (Kahneman and Tversky 1979).

5.2 Managerial & Theoretical Implications:

The research underscores the significance of circuit breakers as vital safeguards in stock markets, especially during economic uncertainty, crises, and information imbalances. It suggests that regulators should consider expanding circuit breaker thresholds to reduce excessive triggering and mitigate market anomalies. The study's insights also enhance our theoretical understanding of market dynamics, including insider trading and management signaling.

5.3 Practical Implications:

For practitioners and investors, the research emphasizes the importance of vigilance and readiness for market responses following circuit breaker events. Recognizing increased speculation can inform investment decisions. Additionally, the differentiation in investor responses to positive and negative circuit breakers highlights the need for a nuanced approach to portfolio management during market volatility. This research offers valuable guidance for navigating the practical implications of circuit breaker-triggered events.

5.4 Limitations and Future Direction:

Given that this study primarily revolves around circuit breaker events, future research endeavors can explore alternative research techniques, employ diverse statistical tools, examine different timeframes, and extend the analysis to various geographical regions or markets.

References

Beneish, M. (1991). 051049 (EW) Stock prices and the dissemination of analysts ' (Author) Off-floor trading , disintegration and the hid-ask spread in experimental markets . Campbell J ., LaMaster S ., Smith V ., University of Transactional risk , market crashes , and the role of circuit breakers . Monetary base growth , deposit growth and inflation in the postwar United States . Boschen J . F ., Talbor K . E ., College of William and Information mirages in experimental asset. 64, 51051.

Bergh, D. D., & Gibbons, P. (2011). The Stock Market Reaction to the Hiring of Management Consultants: A Signalling Theory Approach. Journal of Management Studies, 48(3), 544–567. https://doi.org/10.1111/j.1467-6486.2010.00957.x

Bonn, H. K. M. A. (2018). 기사 (Article) 와 안내문 (Information) [. The Eletronic Library, 34(1), 1–5.

Bowe, M., & Domuta, D. (2004). Investor herding during financial crisis: A clinical study of the Jakarta Stock Exchange. Pacific Basin Finance Journal, 12(4), 387–418. https://doi.org/10.1016/j.pacfin.2003.09.003

Brown, M. B., & Forsythe, A. B. (1974). Robust tests for the equality of variances. Journal of the American Statistical Association, 69(346), 364–367. https://doi.org/10.1080/01621459.1974.10482955

Bulkley, G., & Harris, R. D. F. (1997). Irrational analysts' expectations as a cause of excess volatility in stock prices. Economic Journal, 107(441), 359–371. https://doi.org/10.1111/j.0013-0133.1997.163.x

Chen, H., Petukhov, A., & Wang, J. (2018). The Dark Side of Circuit Breakers. Working Paper. http://www.hec.ca/finance/Fichier/Chen2018.pdf

Chen, Z., Li, J., & Li, Y. (2024). Decomposing the Relation between Irrational behaviors and Beta. Available at SSRN 4869532.

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. Journal of Management, 37(1), 39–67. https://doi.org/10.1177/0149206310388419

Day, M. Y., Huang, P., Cheng, Y., & Ni, Y. (2023). Can Investors Profit from Utilizing Technical Trading Rules During the COVID-19 Pandemic?. International Journal of Information Technology & Decision Making, 22(06), 1893-1921.

Dhall, R., & Singh, B. (2020). The COVID-19 Pandemic and Herding Behaviour: Evidence from India's Stock Market. Millennial Asia, 11(3), 366–390. https://doi.org/10.1177/0976399620964635

Dreman, D. N., Lufkin, E. a, Dreman, D. N., & Lufkin, E. a. (2010). Journal of Psychology and Financial Markets Investor Overreaction : Evidence That Its Basis Is Psychological Investor Overreaction : Evidence That Its Basis Is Psychological. March 2015, 37–41. https://doi.org/10.1207/S15327760JPFM0101

Dsouza, J. J., & Mallikarjunappa, T. (2015). Does the Indian Stock Market Exhibit Random Walk? Paradigm, 19(1), 1–20. https://doi.org/10.1177/0971890715585197

DURBIN, J., & WATSON, G. S. (1950). Testing for serial correlation in least squares regression. I. Biometrika, 37(3–4), 409–428. https://doi.org/10.1093/biomet/37.3-4.409

Fisher, R. A. (1918). Reproduced by permission of the Royal Society of Edinburgh from Transactions of the Society, vol. 52: 399-433 (1918). Society, 52, 399–433.

FULLER, D. A. D. and W. A. (1976). Distribution of the Estimators for Autoregressive Time Series With a Unit Root. Journal of the American Statistical Association, 1(1), 427–431. https://doi.org/10.1080/01621459.1979.10482531

Grossman, S., Stiglitz, J., Grossman, S., & Stiglitz, J. (1976). Information and Competitive Price Systems. The American Economic Review, 66(2), 246–253. https://doi.org/10.2307/1817229

Hamid, K., Suleman, M. T., Shah, S. Z. A., & Akash, R. S. I. (2010). Testing the weak form of efficient market hypothesis: Empirical evidence from Asia-Pacific markets. International Research Journal of Finance and Economics, 58(58), 121–133. https://doi.org/10.2139/ssrn.2912908

Hastings, C., Mosteller, F., Tukey, J. W., & Winsor, C. P. (1947). Low Moments for Small Samples: A Comparative Study of Order Statistics. The Annals of Mathematical Statistics, 18(3), 413–426. https://doi.org/10.1214/aoms/1177730388

Hirshleifer, D., & Hong Teoh, S. (2003). Herd behaviour and cascading in capital markets: A review and synthesis. European Financial Management, 9(1), 25–66. https://doi.org/10.1111/1468-036X.00207

Humayun Kabir, M., & Shakur, S. (2018). Regime-dependent herding behavior in Asian and Latin American stock markets. Pacific Basin Finance Journal, 47, 60–78. https://doi.org/10.1016/j.pacfin.2017.12.002

Kahneman, D., & Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen. Cognition, 7(4), 409–411. https://doi.org/10.1016/0010-0277(79)90024-6

Kim, Y. H., & Yang, J. J. (2004). What makes circuit breakers attractive to financial markets? A survey. Financial Markets, Institutions and Instruments, 13(3). https://doi.org/10.1111/j.0963-8008.2004.00074.x

LAUTERBACH, B., & BEN-ZION, U. (1993). Stock Market Crashes and the Performance of Circuit Breakers: Empirical Evidence. The Journal of Finance, 48(5), 1909–1925. https://doi.org/10.1111/j.1540-6261.1993.tb05133.x

Leroy, S. L. (1990). Market Volatility - Shiller,Rj. Journal of Finance, 45(5), 1721–1723.

Li, Z., Hou, K., & Zhang, C. (2020). The impacts of circuit breakers on China’s stock market. Pacific Basin Finance Journal, September 2019, 101343. https://doi.org/10.1016/j.pacfin.2020.101343

Lux, T. (1995). Herd Behaviour, Bubbles and Crashes. The Economic Journal, 105(431), 881. https://doi.org/10.2307/2235156

Magid, L. J., & King, M. (1991). The Journal of. 95(11), 4173–4176.

Mobarek, A., Mollah, S., & Keasey, K. (2014). A cross-country analysis of herd behavior in Europe. Journal of International Financial Markets, Institutions and Money, 32(1), 107–127. https://doi.org/10.1016/j.intfin.2014.05.008

Moin, A., Quddoos, M. U., & Akhtar, M. H. (2020). Circuit Breakers , Signaling and Overreaction : A Case of Pakistan Stock Exchange Abstract : 40(2), 797–804.

Nelson, P. (1970). Information and Consumer Behavior. Journal of Political Economy, 78(2), 311–329. https://doi.org/10.1086/259630

Nisar, S., & Hanif, M. (2012). Testing weak form of efficient market hypothesis: Empirical evidence from South-Asia. World Applied Sciences Journal, 17(4), 414–427.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. Biometrika, 75(2), 335–346. https://doi.org/10.1093/biomet/75.2.335

Santoni, G. J., & Liu, T. (1993). Circuit breakers and stock market volatility. Journal of Futures Markets, 13(3), 261–277. https://doi.org/10.1002/fut.3990130304

Spence. (1973). I shall argue that the paradigm case of the market with this type of informational structure is the job market and will therefore focus upon it . By the end I hope it will be clear (although space limitations will not permit an extended argument) that a. The Quarterly Journal of Economics, 87(3), 355–374.

Spence, M. (2002). Signaling in retrospect and the informational structure of markets. American Economic Review, 92(3), 434–459. https://doi.org/10.1257/00028280260136200

Stiglitz, J. E. (1985). Information and Economic Analysis: A Perspective. The Economic Journal, 95(1985), 21. https://doi.org/10.2307/2232867

Switzer, L. N., & Yue, H. (2019). Effects of the short sale circuit breaker on the stock market. Journal of International Financial Management and Accounting, 30(3), 250–274. https://doi.org/10.1111/jifm.12105

Yao, J., Ma, C., & He, W. P. (2014). Investor herding behaviour of Chinese stock market. International Review of Economics and Finance, 29(August), 12–29. https://doi.org/10.1016/j.iref.2013.03.002

Yasar, B., Martin, T., & Kiessling, T. (2020). An empirical test of signalling theory. Management Research Review, 43(11), 1309–1335. https://doi.org/10.1108/MRR-08-2019-0338

Zahera, S. A., & Bansal, R. (2018). Do investors exhibit behavioral biases in investment decision making? A systematic review. Qualitative Research in Financial Markets, 10(2), 210-251.

Zahera, S. A., & Bansal, R. (2019). A study of prominence for disposition effect: a systematic review. Qualitative Research in Financial Markets, 11(1), 2-21.